

What is claimed is:

1. A deterioration detector for a pulse detector comprising a pulse sensor device comprising a first transmitting element and a first receiving element for receiving a reflected signal transmitted from the first transmitting element,

the deterioration detector being used for quantitatively detecting progress of deterioration of the pulse sensor device,

the deterioration detector comprising a second transmitting element and a second receiving element, which are disposed so as to be paired with the pulse sensor device of the pulse detector,

wherein, when the pulse sensor device is installed in the deterioration detector, the second transmitting element and the second receiving element are disposed so that the first transmitting element provided in the pulse sensor device and the second receiving element provided in the deterioration detector face each other, and the first receiving element provided in the pulse sensor device and the second transmitting element provided in the deterioration detector face each other.

2. A deterioration detector according to claim 1, further comprising a first judgment means for comparing a received output of the second receiving element when the first transmitting element is driven with a threshold value stored in advance in the first judgement means, to thereby judge progress of deterioration of the first transmitting element.

3. A deterioration detector according to claim 1, further comprising a second judgment means for comparing a received output of the first receiving element when the second receiving element is driven with a threshold value stored in advance in the second judgment means, to thereby judge the progress of deterioration of the first receiving element.

4. A deterioration detector according to claim 2, wherein the threshold value used in the first judgment means of the deterioration detector is a value obtained by multiplying an amplitude of an output voltage waveform of the received signal at a time of an initial operation by a predetermined coefficient.

5. A deterioration detector according to claim 3, wherein the threshold value used in the second judgment means of the deterioration detector is a value obtained by multiplying an amplitude of an output voltage waveform of the received signal at a time of an initial operation by a predetermined coefficient.

6. A deterioration detector according to claim 2, wherein the threshold value used in the first judgment means of the deterioration detector is a value obtained by multiplying a power spectrum at a specific frequency of the received signal at a time of an initial operation by a predetermined coefficient.

7. A deterioration detector according to claim 3, wherein the threshold value used in the second judgment means of the deterioration detector is a value obtained by multiplying a power

spectrum at a specific frequency of the received signal at a time of an initial operation by a predetermined coefficient.

8. A deterioration detector according to claim 1, wherein the deterioration detector is provided in a charger of the pulse detector.

9. A deterioration detection method for a pulse detector comprising a pulse sensor device comprising a first transmitting element and a first receiving element for receiving a reflected signal transmitted from the first transmitting element,

the deterioration detection method being used for quantitatively detecting progress of deterioration of the pulse sensor device using a deterioration detector comprising a second transmitting element and a second receiving element,

the deterioration detection method comprising:

disposing such that the first transmitting element provided in the pulse sensor device and the second receiving element provided in the deterioration detector face each other, and the first receiving element provided in the pulse sensor device and the second transmitting element provided in the deterioration detector face each other;

comparing at least one of a received output of the second receiving element when the first transmitting element is driven and a received output of the first receiving element when the second transmitting element is driven with a threshold value stored in

advance in the deterioration detector; and

judging progress of deterioration of at least one of the first transmitting element and the first receiving element.

10. A deterioration detection method according to claim 9, wherein the threshold value stored in advance in the deterioration detector is a value obtained by multiplying at least one of an amplitude of an output voltage waveform of a signal received by the first receiving element and an amplitude of an output voltage waveform of a signal received by the second receiving element at a time of an initial operation by a predetermined coefficient.

11. A deterioration detection method according to claim 9, wherein the threshold value stored in advance in the deterioration detector is a value obtained by multiplying at least one of a power spectrum at a specific frequency of a signal received by the first receiving element and a power spectrum at a specific frequency of a signal received by the second receiving element at a time of an initial operation by a predetermined coefficient.

12. A deterioration detecting system comprising: a living body information terminal for detecting living body information; a deterioration detector for detecting progress of deterioration of a sensor device used in the living body information terminal for detecting a biomedical signal; a monitoring terminal for receiving detected data from the deterioration detector to record a history of received data; and a central server connected to the

monitoring terminal through a public line,

wherein one of the monitoring terminal and the central server estimates a future deterioration state of the sensor device based on a history of deterioration data of the sensor device.

13. A deterioration detecting system according to claim 12, wherein the deterioration detector further estimates a future deterioration state of the sensor device based on the history of the deterioration data of the sensor device.

14. A deterioration detecting system according to claim 12, wherein the living body information terminal is a pulse detector comprising a pulse sensor device, and the deterioration detector quantitatively detects the progress of deterioration of the pulse sensor device.

15. A deterioration detecting system according to claim 12, wherein information of the progress of deterioration of the sensor device and information of estimated time when living body information becomes unable to be detected are transmitted from the monitoring terminal or the central server to the living body information terminal to be displayed on display means provided in the living body information terminal.

16. A deterioration detecting system according to claim 13, wherein information of the progress of deterioration of the sensor device and information of estimated time when living body information becomes unable to be detected are transmitted from the

deterioration detector to the living body information terminal to be displayed on display means provided in the living body information terminal.

17. A deterioration detecting system according to claim 12, wherein the pulse sensor device has a first transmitting piezoelectric element and a first receiving piezoelectric element for receiving a reflected wave of a transmission wave generated from the first transmitting piezoelectric element, and the deterioration detector has a second transmitting piezoelectric element and a second receiving piezoelectric element.

18. A deterioration detecting system according to claim 12, wherein the pulse sensor device has a first light emitting element and a first light receiving element for receiving reflected light of light emitted from the first light emitting element, and the deterioration detector has a second light emitting element and a second light receiving element.

19. A deterioration detector for a pulse detector comprising a pulse sensor device comprising a first transmitting piezoelectric element for generating an ultrasonic wave and a first receiving piezoelectric element for receiving a reflected wave of the ultrasonic wave transmitted from the first transmitting piezoelectric element,

the deterioration detector being used for quantitatively detecting progress of deterioration of the pulse sensor device,

the deterioration detector comprising:

a second transmitting piezoelectric element and a second receiving piezoelectric element disposed so as to be paired with the pulse sensor device of the pulse detector,

wherein the second transmitting piezoelectric element and the second receiving piezoelectric element are disposed so that the first transmitting piezoelectric element provided in the pulse sensor device and the second receiving piezoelectric element provided in the deterioration detector face each other, and the first receiving piezoelectric element provided in the pulse sensor device and the second transmitting piezoelectric element provided in the deterioration detector face each other.

20. A deterioration detector according to claim 19, further comprising a first judgment means for comparing a received output of the second receiving piezoelectric element when the first transmitting piezoelectric element is driven with a threshold value stored in advance in the judgement means, to thereby judge progress of deterioration of the first transmitting piezoelectric element.

21. A deterioration detector according to claim 19, further comprising a second judgment means for comparing a received output of the first receiving piezoelectric element when the second receiving piezoelectric element is driven with a threshold value stored in advance in the second judgment means, to thereby judge progress of deterioration of the first receiving piezoelectric

element.

22. A deterioration detector according to claim 20, wherein the threshold value used for the first judgment means of the deterioration detector is a value obtained by multiplying an amplitude of an output voltage waveform of the received ultrasonic wave at a time of an initial operation by a predetermined coefficient.

23. A deterioration detector according to claim 21, wherein the threshold value used for the second judgment means of the deterioration detector is a value obtained by multiplying an amplitude of an output voltage waveform of the received ultrasonic wave at a time of an initial operation by a predetermined coefficient.

24. A deterioration detector according to claim 20, wherein the threshold value used for the first judgment means of the deterioration detector is a value obtained by multiplying a power spectrum at a specific frequency of the received ultrasonic wave at a time of an initial operation by a predetermined coefficient.

25. A deterioration detector according to claim 21, wherein the threshold value used for the second judgment means of the deterioration detector is a value obtained by multiplying a power spectrum at a specific frequency of the received ultrasonic wave at a time of an initial operation by a predetermined coefficient.

26. A deterioration detector according to claim 20,



wherein the deterioration detector is provided in a charger of the pulse detector.

27. A deterioration detection method, comprising:

comparing a received output of a receiving piezoelectric element when a transmitting piezoelectric element is driven with a threshold value stored in advance in a deterioration detector; and

judging progress of deterioration of the receiving piezoelectric element based on comparison results.

28. A deterioration detection method according to claim 27, wherein the threshold value stored in advance in the deterioration detector is a value obtained by multiplying an amplitude of an output voltage waveform of a received ultrasonic wave at a time of an initial operation by a predetermined coefficient.

29. A deterioration detection method according to claim 27, wherein the threshold value stored in advance in the deterioration detector is a value obtained by multiplying a power spectrum at a specific frequency of a received ultrasonic wave at a time of an initial operation by a predetermined coefficient.

30. A deterioration detection method for a pulse detector comprising a pulse sensor device comprising a first transmitting piezoelectric element and a first receiving piezoelectric element for receiving a reflected signal of a signal transmitted from the first transmitting piezoelectric element,

the deterioration detection method being used for quantitatively detecting progress of deterioration of the pulse sensor device using a deterioration detector having a second transmitting piezoelectric element and a second receiving piezoelectric element,

the deterioration detection method comprising:

disposing such that the first transmitting piezoelectric element provided in the pulse sensor device and the second receiving piezoelectric element provided in the deterioration detector face each other, and the first receiving piezoelectric element provided in the pulse sensor device and the second transmitting piezoelectric element provided in the deterioration detector face each other;

comparing at least one of a received output of the second receiving piezoelectric element when the first transmitting piezoelectric element is driven and a received output of the first receiving piezoelectric element when the second transmitting piezoelectric element is driven with a threshold value stored in advance in the deterioration detector; and

judging progress of deterioration of at least one of the first transmitting piezoelectric element and the first receiving piezoelectric element.

31. A deterioration detection method according to claim 30, wherein the threshold value stored in advance in the deterioration detector is a value obtained by multiplying at least one of an

amplitude of an output voltage waveform of a signal received by the first receiving piezoelectric element and an amplitude of an output voltage waveform of a signal received by the second receiving piezoelectric element at a time of an initial operation by a predetermined coefficient.

32. A deterioration detection method according to claim 30, wherein the threshold value stored in advance in the deterioration detector is a value obtained by multiplying at least one of a power spectrum at a specific frequency of a signal received by the first receiving piezoelectric element and a power spectrum at a specific frequency of a signal received by the second receiving piezoelectric element at a time of an initial operation by a predetermined coefficient.

33. A deterioration detector for a pulse detector comprising a pulse sensor device comprising a first light emitting element and a first light receiving element for receiving a reflected light transmitted from the first light emitting element,

the deterioration detector being used for quantitatively detecting progress of deterioration of the pulse sensor device,

the deterioration detector comprising:

a second light emitting element and a second light receiving element disposed so as to be paired with the pulse sensor device of the pulse detector,

wherein, when the pulse sensor device is installed in the

deterioration detector, the second light emitting element and the second light receiving element are disposed so that the first light emitting element provided in the pulse sensor device and the second light receiving element provided in the deterioration detector face each other, and the first light receiving element provided in the pulse sensor device and the second light emitting element provided in the deterioration detector face each other.

34. A deterioration detector for a pulse detector comprising a pulse sensor device comprising a first light emitting element and a first light receiving element for receiving reflected light emitted from the first light emitting element,

the deterioration detector being used for quantitatively detecting progress of deterioration of the pulse sensor device,

the deterioration detector comprising:

a second light emitting element and a second light receiving element disposed so as to be paired with the pulse sensor device of the pulse detector,

at least one of a first optical element and a second optical element,

the first optical element performs one of guiding the light emitted from the first light emitting element, condensing the emitted light, and changing a light emission direction of the emitted light so that the light emitted from the first light emitting element is received by the second light receiving element,

the second optical element performs one of guiding the light emitted from the second light emitting element, condensing the emitted light, and changing a light emission direction of the emitted light so that the light emitted from the second light emitting element is received by the first light receiving element.

35. A deterioration detector according to claim 34, wherein the first optical element is one member selected from the group consisting of a light guiding plate, an optical fiber, a reflecting plate, a lens, and a prism.

36. A deterioration detector according to claim 34, wherein the second optical element is one member selected from the group consisting of a light guiding plate, an optical fiber, a reflecting plate, a lens, and a prism.

37. A deterioration detector according to claim 34, further comprising a first judgment means for comparing a received light output of the second light receiving element when the first light emitting element is driven with a threshold value stored in advance in the first judgement means, to thereby judge progress of deterioration of the first light emitting element.

38. A deterioration detector according to claim 37, further comprising a second judgment means for comparing a received light output of the first light receiving element when the second light receiving element is driven with a threshold value stored in advance in the second judgement means, to thereby judge progress

of deterioration of the second light receiving element.

39. A deterioration detector according to claim 37, wherein the threshold value used for the first judgment means of the deterioration detector is a value obtained by multiplying an amplitude of an output voltage waveform of the received light at a time of an initial operation by a predetermined coefficient.

40. A deterioration detector according to claim 38, wherein the threshold value used for the second judgment means of the deterioration detector is a value obtained by multiplying an amplitude of an output voltage waveform of the received light at a time of an initial operation by a predetermined coefficient.

41. A deterioration detector according to claim 37, wherein the threshold value used for the first judgment means of the deterioration detector is a value obtained by multiplying a power spectrum at a specific frequency of the received light at a time of an initial operation by a predetermined coefficient.

42. A deterioration detector according to claim 38, wherein the threshold value used for the second judgment means of the deterioration detector is a value obtained by multiplying a power spectrum at a specific frequency of the received light at a time of an initial operation by a predetermined coefficient.

43. A deterioration detector according to claim 33, wherein the deterioration detector is provided in a charger of the pulse detector.

44. A deterioration detector according to claim 34, wherein the deterioration detector is provided in a charger of the pulse detector.

45. A deterioration detection method for a pulse detector comprising a pulse sensor device comprising a first light emitting element and a first light receiving element for receiving reflected light emitted from the first light emitting element,

the deterioration detection method being used for quantitatively detecting progress of deterioration of the pulse sensor device using a deterioration detector having a second light emitting element and a second light receiving element,

the deterioration detection method comprising:

disposing such that the first light emitting element provided in the pulse sensor device and the second light receiving element provided in the deterioration detector face each other, and the first light receiving element provided in the pulse sensor device and the second light emitting element provided in the deterioration detector face each other;

comparing at least one of a received light output of the second receiving element when the first light emitting element is driven, and a received light output of the first receiving element when the second light emitting element is driven with a threshold value stored in advance in the deterioration detector; and

judging progress of deterioration of at least one of the first

light emitting element and the first receiving element based on comparison results.

46. A deterioration detection method for a pulse detector comprising a pulse sensor device comprising a first light emitting element and a first light receiving element for receiving reflected light emitted from the first light emitting element,

the deterioration detection method being used for quantitatively detecting progress of deterioration of the pulse sensor device using a deterioration detector having a second light emitting element and a second light receiving element,

the deterioration detection method comprising:

providing the deterioration detector with at least one of a first optical element and a second optical element;

receiving light emitted from the first light emitting element by the second light receiving element by one of direct receiving, guiding the emitted light, condensing the emitted light, and by changing a light emission direction of the emitted light using the first optical element;

receiving light emitted from the second light emitting element by the first light receiving element by one of direct receiving, guiding the emitted light, condensing the emitted light, and by changing a light emission direction of the emitted light using the second optical element;

comparing at least one of an output of received light of the



second light receiving element when the first light emitting element is driven and an output of received light of the first light receiving element when the second light emitting element is driven with a threshold value stored in advance; and

judging progress of deterioration of at least one of the first light emitting element and the first light receiving element.

47. A deterioration detection method according to claim 46, wherein the first optical element is one member selected from the group consisting of a light guiding plate, an optical fiber, a reflecting plate, a lens, and a prism.

48. A deterioration detection method according to claim 46, wherein the second optical element is one member selected from the group consisting of a light guiding plate, an optical fiber, a reflecting plate, a lens, and a prism.

49. A deterioration detection method according to claim 45, wherein the threshold value stored in advance in the deterioration detector is a value obtained by multiplying at least one of an amplitude of an output voltage waveform of light received by the first light receiving element and an amplitude of an output voltage waveform of light received by the second light receiving element at a time of an initial operation by a predetermined coefficient.

50. A deterioration detection method according to claim 46, wherein the threshold value stored in advance in the deterioration detector is a value obtained by multiplying at least one of an

amplitude of an output voltage waveform of light received by the first light receiving element and an amplitude of an output voltage waveform of light received by the second light receiving element at a time of an initial operation by a predetermined coefficient.

51. A deterioration detection method according to claim 45, wherein the threshold value stored in advance in the deterioration detector is a value obtained by multiplying at least one of a power spectrum at a specific frequency of light received by the first receiving element a power spectrum at a specific frequency of light received by the second receiving element at a time of an initial operation by a predetermined coefficient.

52. A deterioration detection method according to claim 46, wherein the threshold value stored in advance in the deterioration detector is a value obtained by multiplying at least one of a power spectrum at a specific frequency of light received by the first receiving element a power spectrum at a specific frequency of light received by the second receiving element at a time of an initial operation by a predetermined coefficient.